

PCIE-8120

PCI Express Media Processing Accelerator

Embedded Computing for
Business-Critical Continuity™

The PCIE-8120 media processing accelerator enables high density voice and video processing to be integrated into a rack mounted server or other network appliances that feature standard PCI Express slots.

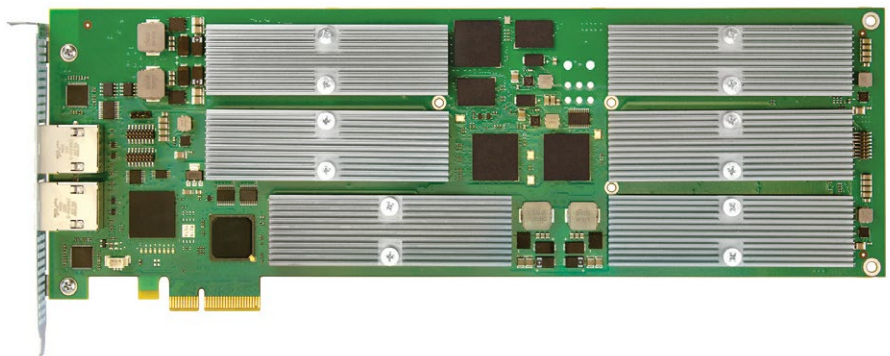
- Single slot full length full height PCI Express card with x4 interface
- High performance media processing core based on power-efficient DSPs
- Optional 2 x GbE ports (RJ45) with NAT function for direct network attachment providing server offload
- Comprehensive voice and video processing firmware and programmers interface included
- Support for 720p and 1080p video conferencing
- Designed for NEBS Level 3 and ETSI telecom standards compliance when used in a suitable carrier grade enclosure

The Emerson Network Power PCIE-8120 is a PCI Express (PCIe) media processing acceleration engine for use in standard server architectures or other appliances that feature full length PCIe slots.

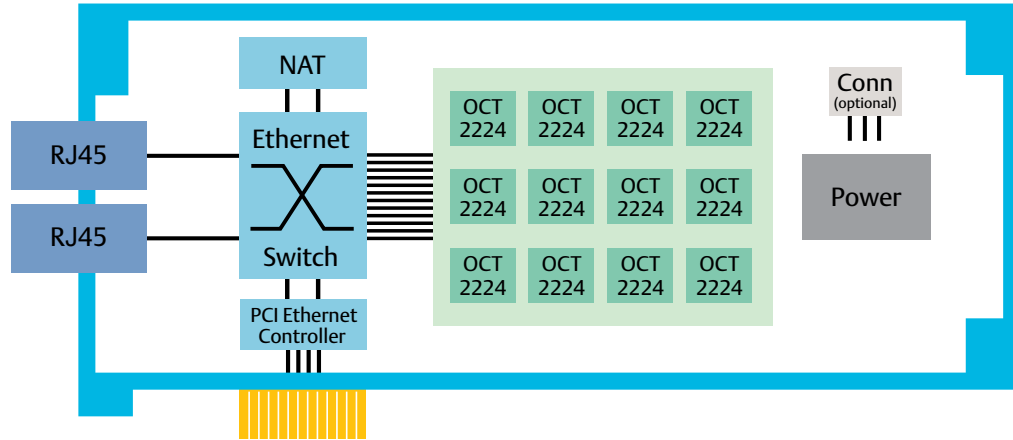
Voice and video streaming is becoming more pervasive as customer demand for media consumption continues to rise, and the diversity of media sources, network conditions and individual consumption devices proliferate. Using traditional Intel® Xeon® server architectures, power and efficiency soon become a limitation when scaling to high channel density media stream transcoding. By employing highly efficient Digital Signal Processors (DSP) to provide direct offload of the host CPU, the new PCIE-8120 acceleration engine can take the place of additional servers when adding high density voice and video processing to an application. Network equipment providers can either add or substantially increase the voice channel or video processing density within existing systems, so reducing overall power and space demands for their equipment as it scales to higher throughput. This board is particularly suited to the following applications:

- Session border controllers (adding voice or video transcode)
- Media gateways
- Media servers/media resource function
- Video/content optimization (transcode and transrating)
- Video communications servers
- Interactive voice and video response systems

PCIE-8120 brings high density DSPs with embedded voice and video firmware from Octasic together with Emerson's strong embedded system heritage and thermal design skill, resulting in an industry-leading media processing density for the next generation of voice and video processing systems.



PCIE-8120 Block Diagram



PCIE-8120 is based around the Octasic OCT2224M multi-core DSP running Vocallo MGW firmware. The DSP array performs media processing acceleration for a host server, supporting both voice and video conferencing and transcode applications.

command/ response protocol aids multi-channel programming efficiency. Additional board support utilities can set the board's internal switching infrastructure into various modes, and provide diagnostic information.

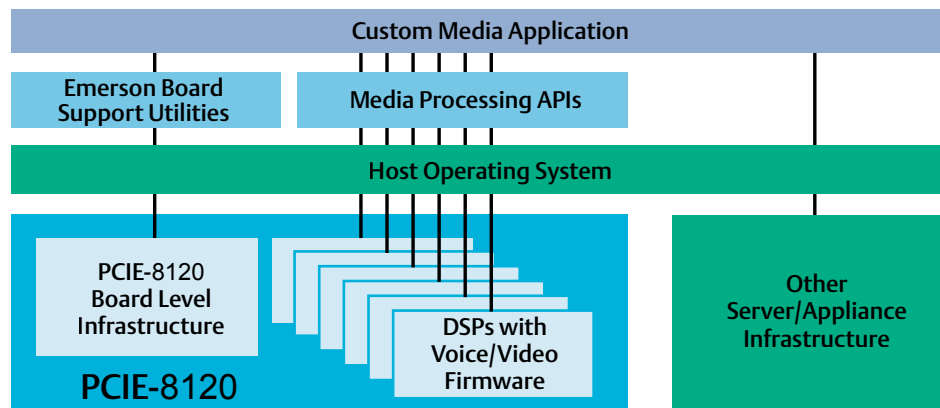
Media acceleration performance depends on both the codecs required and the number of DSPs available. A variety of board configurations allow for differences in application needs and server capabilities, and include a choice of 4, 8 and 12 DSPs, with maximum power consumption between 25W and 65W. For systems with limitations on PCIe slot power, an external power connection option is available by special arrangement.

The internal data flows of the board are all based on Gigabit Ethernet connections with all DSPs accessible via a local Ethernet switching subsystem. Host access to all the DSPs is via a 2 x 1Gb/s PCI Ethernet controller. The Ethernet switching subsystem also supports two 1Gb/s links to each DSP to support special 1080p video conferencing modes.

A comprehensive host-based media processing Application Programmers Interface (API) is provided. This is used to configure and execute voice and video stream processing functions. The API commands communicate directly with the DSP array based on an endpoint and stream resource model. A non-blocking

Media streams can be routed to the DSPs either via the host CPU or optionally via two external Gigabit Ethernet ports provided for direct traffic termination. In this configuration, packets for transcode can bypass the host computer entirely while a special Network Address Translation (NAT) device makes the hardware and software architecture.

Software Architecture



Media Processing Functions

TRANSPORT AND ENDPOINT SUPPORT

- Voice and video over IP endpoints
 - ▲ RTP/UDP/IP endpoint
 - ▲ IPv4 with DHCP & IPv6
 - ▲ Supports secure RTP
 - ▲ Adaptive jitter buffer
 - ▲ Supports RTCP [RTCP-XR in mid 2013]
- Line echo cancellation and voice quality enhancements
 - ▲ G.168 (2004) compliant line echo cancellation, up to 128ms tail, with HLC and music protection
 - ▲ Manual and automatic level control (G.169)
 - ▲ Acoustic Echo Control (AEC)
 - ▲ Adaptive Noise Reduction (ANR)
 - ▲ Natural Level Enhancement (NLE)
- Endpoint statistics
 - ▲ RTP/UDP/IP per channel and per port packets and errors
 - ▲ Per channel/port states, terminations used, media stream events

AUDIO STREAM PROCESSING

- 3GPP/3GPP2 wireless voice codecs
 - ▲ GSM Full Rate (FR) and Enhanced Full Rate (EFR)
 - ▲ GSM Adaptive Multi-Rate (AMR)
 - ▲ GSM wideband AMR-WB (G.722.2)
 - ▲ EVRC and EVRC-B (subject to additional upgrade license fee)
- ITU-T, IETF, and other voice codecs
 - ▲ G.711 μ -law/A-law with appendices I and II
 - ▲ Silence suppression with spectral comfort noise generation
 - ▲ Clear channel operation
 - ▲ Narrowband: G.729AB, G.729.1, G.723.1A, G.726, G.727
 - ▲ Wideband: G.722, G.722.1
 - ▲ T.38 fax relay
 - ▲ V.152 voice band data
 - ▲ iLBC
 - ▲ SILK (Skype codec) [mid 2013]
 - ▲ OPUS [planned for late 2013]
- In-band announcements and signaling support
 - ▲ Announcements and message playback
 - ▲ Tone detection, generation and removal
 - ▲ SS5, MFR1, MFR2, DTMF

- ▲ Tone relay (RFC 2833/4733)
- ▲ Caller ID generation and detection (ETSI, BellCore and NTT)
- N-way audio conferencing
 - ▲ All channels on a DSP can participate in one or many conferences
 - ▲ Noise reduction for conferencing
 - ▲ Prime speaker detection
 - ▲ Conference supervisor function

VIDEO STREAM PROCESSING

- Video encoder/decoder support
 - ▲ H.263 profile 0 (baseline) and 3 level 10, 20, 30, 40, 45 and 50 (CIF/QCIF) RFC4629
 - ▲ MPEG-4 simple profile, single object level 0, 1, 2 and 3 (CIF/QCIF) RFC3016
 - ▲ H.264 baseline profile [high profile mid 2013] level 1, 1b, 1.1, 1.2, 1.3 (CIF/QCIF) level 2.2 (VGA), 3.2 (720p) and 4.2 (1080p) RFC3984
- Scaling and adaptation
 - ▲ Advanced-CBR, CBR and VBR rate controllers
 - ▲ Frame rate adaptation up to 30 FPS/channel
 - ▲ Scaling between resolutions, from SQCIF to 1080p
 - ▲ Packet loss concealment
 - ▲ A/V synchronization (lip sync) via delay compensation
- Video conferencing/mixing support
 - ▲ Video MCU function
 - ▲ Voice activity based source selection
 - ▲ Graphics overlay with key color
 - ▲ Video mix: up to 16 layers per stream for video or graphics

Technical Specifications

HARDWARE

- Form factor: PCIe long card
 - ▲ Full height (106mm) x full length (311mm), single-slot width
 - ▲ PCIe X4 Gen 2 electrical connection
- DSP core
 - ▲ Multicore Octasic OCT2224M DSPs running Vocallo
 - ▲ MGW firmware
 - ▲ Standard variants: 4, 8 or 12 DSPs
- External Ethernet port option
 - ▲ 2 x Gigabit Ethernet (GbE) 1000BASE-T RJ45
 - ▲ Network address translation function makes DSP array look like single IP address (up to 1Gbit/s)

- Internal Ethernet infrastructure capacity
 - ▲ 2 x 1Gbit/s to host via PCI Ethernet controller
 - ▲ 2 x 1Gbit/s to each DSP to support 1080p video conference function
 - ▲ 2 x 1Gbit/s to external ports
- Board control and management functions
 - ▲ On-board temperature monitoring and reporting
 - ▲ Individual DSP and other function resets

DEPLOYMENT ENVIRONMENT

- Board power consumption (estimated worst case)
 - ▲ 4 DSP variant: 25W
 - ▲ 8 DSP variant: 46W
 - ▲ 12 DSP variant: 65W
- Board operating temperature
 - ▲ Normal operation: 0 °C to 40 °C
 - ▲ NEBS exceptional operation: 0 °C to 55 °C [in suitable enclosure]

- Cooling requirement
 - ▲ Passive heatsinks (requires forced air flow)
 - ▲ Approx 4CFM for 12 DSP card at 40 °C ambient
 - ▲ Approx 5CFM for 12 DSP card at 55 °C ambient

HOST SOFTWARE ENVIRONMENT

- Host operating system
 - ▲ Red Hat Linux 6.3/CentOS
- Programmers environment
 - ▲ Octasic Vocallo MGW SDK and documentation
 - ▲ Octasic debug tools
 - ▲ Emerson PCIE-8120 board support and configuration

Standard Board Configurations				
Part number	Number of DSPs	External GBE ports	Audio processing	Video processing
PCIE-8120-A12-N	12	No	Yes	No
PCIE-8120-V12-N	12	No	Yes	Yes
PCIE-8120-A04	4	Yes	Yes	No
PCIE-8120-V04	4	Yes	Yes	Yes
PCIE-8120-A08	8	Yes	Yes	No
PCIE-8120-V08	8	Yes	Yes	Yes
PCIE-8120-A12	12	Yes	Yes	No
PCIE-8120-V12	12	Yes	Yes	Yes

Representative Performance*			
Media processing application	4 DSPs	8 DSPs	12 DSPs
Standard voice gateway/transcode: G.711 (20ms) <=> G.729AB (20ms)	2560 channels	5120 channels	7680 channels
Wireless voice gateway/transcode: G.711(20ms) <=> AMR NB (20ms)	1716 channels	3432 channels	5148 channels
Mobile video transcode MPEG4/CIF => H.264/CIF 15fps	128 channels	256 channels	384 channels
HD video conference H.264/720p 30fps x 4 participant conferences	2 bridges	4 bridges	6 bridges

*Note: exact performance depends on many factors including exact codec mix and use patterns. These figures are provided as guidance to potential performance.

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